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Tar paper cases for winter protection do well in ordinary winters.

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WINTERING BEES IN IOWA

By Frank C. Pellett, State Inspector of Apiaries, Atlantic, Iowa.

With the rank and file of the bee keepers in Iowa, the wintering problem is the most serious one they have to face. In some localities brood diseases may be a serious menace for a time and cause great losses, but the wintering problem must be met in all sections of the state, and be faced every winter. While the professional bee keeper has learned to prepare his bees for winter so carefully as to meet with little loss, the average small bee keeper suffers seriously from this cause and in severe winters occasionally loses a large part of his stock.

This bulletin presents the best methods of a large number of the most successful bee men, some of whom have had from 30 to 50 years' experience. These methods have stood the test of time under Iowa conditions, and among them anyone may find some plan that will meet his individual needs.

ESSENTIALS OF SUCCESSFUL WINTERING.

It is common to speak of the wintering of bees as though proper protection were all of the problem. In fact, at least two other things are of more importance: first, of course, a supply of food large enough to last until the flowers bloom again; next, a vigorous young queen. After these, suitable protection should be provided.

Where the bees are unable to fly for long periods of time as in winter, proper food is of great importance. Normally, the bee voids its excrement only while on the wing. The wastes that accumulate in its body during its long weeks of inactivity are a severe tax at best and with poor food stores, the quantity becomes so great as to swell the abdomen to such a point as to cause death. In mild winters, when there is opportunity for an occasional flight, bees wintered out of doors will go through safely on almost any kind of stores if the quantity is sufficient. Bees wintered in cellars, or outside in severe weather, cannot be expected to come through in good condition on poor stores.

WHITE HONEY THE BEST WINTER FEED.

The whiter the honey, as a rule, the less waste it contains, and there is no better winter feed than Iowa white clover honey. The dark fall honey, especially when mixed with pollen, is much less desirable, and honey dew is very disastrous. It is a common plan among practical apiarists, to extract all dark honey from the combs late in the fall, and replace with combs of sealed white honey, or to feed sugar syrup. The best grade of granulated sugar should always be used for this purpose, as it makes a very

good substitute for honey for wintering. The syrup should be made very thick, to save the bees the tax of evaporating unnecessary moisture. Equal parts of sugar and water are frequently used, although some use less water. When it becomes necessary to feed from lack of sufficient stores, or to replace unsuitable stores, it should be done as soon as possible after the close of the honey flow, to give the bees time to get things in readiness for winter before cold weather begins.

FEEDING.

Where only a small quantity of feed is to be given, about the simplest way to do it is to set an empty super on top of the hive, and place a pan of syrup in it. Over the syrup should be placed a thin, white, cotton cloth large enough for the edges to drop down around the pan. The bees can crawl over the syrup and suck it through the cloth without danger of drowning. The cloth should be left loose enough to settle to the center of the pan as the syrup is removed, thus enabling the bees to take it all. In favorable weather, a pan of syrup will be emptied in a few hours. If the weather is frosty and the bees are slow in taking it, place the super under the hive, instead of on top. As soon as a sufficient quantity has been fed, remove the empty super and replace the cover so that it may be sealed down tight before the coming of cold nights.

Where many colonies are to be fed, or a large quantity of feeding is to be done, some of the special feeders are usually preferred. The Doolittle division board feeder is one of the most popular. It is placed in the hive in the same manner as a brood frame, and filled from the top from the snout of a tea kettle or similar vessel.

There are numerous other kinds of feeders on the market each having its advantages and advocates, who would use no other. The style of feeder is unimportant, so long as the feeding is done at the proper time. Few of those in common use are patented and they may be made at home.

FAILING QUEENS.

It often happens that a colony which has been strong all summer and perhaps has stored a large surplus, will die during the the winter or early spring from the failure of the old queen. It is important that the bee keeper see that all colonies have vigorous queens at the time of preparing for winter. All colonies that cast swarms during the season will have young queens, if they have any at all, as the old queen always leaves the hive to go with the swarm. For this reason it frequently happens that one will get a new swarm only to find it dead or worthless the following spring. The bees usually replace a failing queen, but not always. When the queen begins to fail late in the fall or

during the winter, conditions are not favorable for rearing another and if they were, she would have no opportunity for mating, so would be worthless.

Practical bee keepers look very carefully after the queens in making winter preparations. It is a common practice to requeen all colonies every year to insure only young queens. Some bee keepers do it every other year, while others keep a record of every hive and replace the queens only when they show signs of failing. If bees are on straight combs in moveable frame hives, as they should be for profitable care, it is easy to remove the old queen. She must always be removed before a new queen is given. Otherwise the bees will destroy the newcomer. Queens are for sale by numerous queen breeders, who will supply them from April until October. Directions for introducing them come with the little cage in which they are mailed.

PROTECTION FROM WIND.

Not all of wintering lies in getting the colonies safely through the winter. It is equally important that they come through in such condition as to build up early, in order that every colony be very populous at the beginning of the honey flow. The changeable weather of early spring must be considered, and some protection provided against the chilling winds of this sea-



Fig. 1.—The windbreak behind the author's apiary. The value of such trees and a thicket cannot be over-estimated.

son. As soon as warm days come, the queens will begin laying in earnest. Within three days from the time the egg is laid the larva is hatched and requires a very warm and even temperature. Baby bees are even more sensitive to unfavorable conditions than baby chicks. It often happens that a few warm days will result in the appearance of considerable quantities of brood in the hive. A sudden drop in the temperature makes it difficult for the bees to keep the temperature sufficiently high, with the result that part of the brood is likely to be chilled and, consequently, lost. Every possible means should be used to save the energy of the colony at this season. When brood rearing commences, the bees require a good deal of water, and this accounts for their frequenting the watering troughs so freely in early spring. Water should be placed near at hand to save long flights in search of it. A tub, trough or other receptacle partly filled with shavings, chips or the like to enable the bees to get the water without drowning, should be provided.

Too much value can hardly be placed upon a good windbreak. Evergreens which break the wind from the north and west are very good. The writer's apiary is sheltered by a blackberry thicket immediately back of the hives and back of this is a grove of native trees. (Fig. 1.) The apiary was formerly in the grove where the wind swept under the trees. The difference in the condition of the colonies in spring, since moving to the new location, is surprising, indeed.

Some bee keepers complain that after they bring their bees safely through the winter in the cellar, they lose a large part of them through the spring, the stock dwindling after being placed on the summer stands. Others not only take pains to place the bees in a carefully sheltered position after they are removed from the cellar, but, in addition, provide some protection in the way of packing.

Over most of Iowa, the principal honey flow is from white clover, which is of comparatively short duration. It is only the colonies that are strong in bees at the beginning of the flow that will return substantial profits to their owners. In localities where the principal flow comes later in the season, not nearly so much importance is placed on the early spring protection.

METHODS OF WINTERING.

It must be borne in mind that the winters are much more severe in the northern part of the state. Some plans that are suited to the conditions of the southern counties would not do in the northern ones. The success or failure of outdoor wintering will depend, to a considerable extent, on the surrounding conditions, such as windbreaks, as well as the actual protection of

the hives. What has been said about the desirability of spring protection for cellar wintered bees will apply with equal force to colonies wintered outside.

TAR PAPER CASES.

One of the most common plans for outdoor wintering, and one which brings very good results in ordinary winters, is the tar paper case. To make this case two or three corn cobs are laid on top of the frames and a cotton cloth spread over them. An empty super is then placed on the hive and filled with dry leaves. The cover is placed on the super and the whole covered with several layers of newspapers. A large sheet of tar paper is then placed over all and folded around the hive and fastened as shown in the illustration on the cover. The hives shown in the picture are without the super of leaves.

The winter of 1911-1912 caused such heavy losses among outdoor wintered colonies that but few advocates of outdoor wintering are now to be found. This was a very unusual winter, with unusually low temperatures and unprecedented long periods between days warm enough for a flight. Investigation shows that a large per cent of the loss in this extraordinary season was due to poor stores and careless preparation for winter. The two preceding winters had been so favorable that many bee keepers were inclined to take a risk rather than go to the trouble of careful preparation. The losses have not been without compensation, for the result will not soon be forgotten, and Iowa bees will receive better attention at the proper time for many years to come.

Out door wintering is very successful in the hands of some bee keepers. In fact, a few have practiced no other method for many years, and get uniformly good results. With outdoor wintering, however, it is very essential that great care be used to see that the stores are sufficient in quantity and of good quality.

One of the principal arguments in favor of cellar wintering is the saving in stores and that is considerable. In general, it is estimated that bees will consume from a third to a half more honey when wintered outside. This is offset by earlier brood rearing and a generally stronger condition where properly wintered outside.

THE DADANT METHOD.

The Dadants are extensively engaged in honey production at Hamilton, Illinois, directly across the river from Keokuk. They use a large hive and cover the brood frames with a straw mat. Woven wire is tacked to the front of the hive and then made to encircle it on both sides and the back. The space thus provided is filled with leaves. The front is provided with no protection.



Fig. 2--The Dadant method of wintering bees in the Dadant hive; C. P. Dadant standing between the hives.

Fig. 2 shows C. P. Dadant and his method of wintering in the Dadant hive, which he has used for many years. The results seem to be uniformly good when proper stores are supplied. This way, while well suited to the conditions of southern Iowa, would hardly be safe much farther north, judging from the reports of outdoor wintering from northern counties. This plan is not well suited to small hives such as the eight frame so commonly used.

PITTING OR BURYING.

A few Iowa bee keepers practice pitting or burying. A trench is dug about 18 inches deep and 2x4's placed in the bottom to keep the hives off the ground. After its bottom has been removed the hive is placed on the 2x4's and its cover slightly lifted to provide for upward ventilation. About eighteen inches of straw is placed over the hives and this in turn is covered with a layer of loose earth. Not over two layers of hives should be placed in such a trench. A well drained situation is essential.

W. P. Southworth of Sioux City has wintered successfully in this way, although failure resulted in some instances. The failure he believed to be the result of disturbance by skunks in one instance, and in another by pitting the bees down too deeply.

J. B. Espy also of Sioux City reports this method as very satisfactory with him.

THE MANLEY METHOD.

B. A. Manley of Milo, Warren county, has wintered outside for twenty-five years with uniformly good results. A method that has proved itself for a quarter of a century is worthy of attention, yet very few follow this plan.

Fig. 3 shows Mr. Manley's bees as packed for winter in his apiary. Mr. Manley describes his plan of wintering as follows:

When I put my bees into winter quarters I build a tight board fence about thirty inches high and place my summer stands about four inches from this fence. The stands are left about three inches apart, and are filled with dry leaves to keep the bottoms of the hives dry. In preparing the bees for winter I leave an empty super on each hive, and place the hives on the stands as above described. In each of these supers I place two or three corn cobs across the brood frames, to give the bees access to all their stores. Over this I place a piece of gunny sack, (burlap) large enough to more than cover, and then fill full of dry leaves or oat chaff, and fold the burlap over at the edges, being careful to press it down in the corners and place the cover on.

I place a ten inch cover over the front, at the top of the brood chamber and, in front of the entrance boards a four inch strip is set on edge. This forms a place to enable me to close



Fig. 3--The wintering method employed successfully by B. A. Manley at Milo, Iowa. (a) Roof of prepared roofing; (b) 10 inch board over entrance; (c) honey house; (d) rear of residence.

the entrance and front with straw or hay. An eight inch board is then placed on edge on top of the ten inch board already placed, and they are ready for the dry leaves, which I crowd into every space, back, between and in front. A light frame work is placed over all and covered with prepared roofing thirty-two inches wide. This is fastened down with tight strips to prevent blowing off.

I am very careful to keep the snow cleared away from the front and on warm days the straw is removed from the entrance to give the bees a chance for a flight. This protection is carefully replaced at night until spring. Thus protected they can be safely left in their winter quarters until the last of April."

One of the peculiarities of Mr. Manley's method, as above described, is the closing of the entrance with loose straw. This would not prevent the circulation of air while keeping out wind and snow. The beginner should be cautioned that this plan is only safe in the hands of one who would be careful to remove the straw from the entrance on days warm enough for the bees to fly.

T. W. Blackman of Nevada, Story county, reports that when he first began keeping bees in the early 80's he wintered by leaning boards against the hives on sides and backs, and stuffing the resulting space with straw. Boards were covered with soil and coarse horse manure banked over all. The fronts, facing south were left without protection. The results were good, but the plan was soon abandoned on account of the crudeness of the method and the disagreeable job of preparing the bees for winter.

CHAFF HIVES.

Too many bees are left without attention in single walled hives and for the average small apiarist the double walled hive shown in fig. 4 would be far better. The space between the two walls of the hive body is packed with chaff and over the brood nest is placed a tray also filled with chaff and a large cover telescopes over all. Fig. 5 shows the hive as it appears in use. During winter the entrance is contracted to a four inch width.

An extensive correspondence has brought out the fact that most of the bee keepers who follow the business extensively are opposed to any plan of outdoor wintering and many report disastrous results with double walled hives. On the other hand there are a few who have great faith in them. For the southern half of the state, with good stores and with proper attention, it is quite sure that results will be satisfactory. Dr. A. F. Bonney of Buck Grove, Crawford county, is an ardent defender of the chaff hive. He states the argument for it in the following letter to the author:

When people like the Roots, of Medina, Ohio, have 1,000 chaff hives in constant use it leaves but little to be said in their favor, I believe.



Fig. 4—Parts of the Buckeye double walled hive.

I have no patience with the "Absorbent cushion" idea. It is not scientific. Condensation is **ONLY POSSIBLE WHEN THE SURROUNDING PARTS ARE COLDER THAN THE PACKING.**

I knew a school teacher once on a time who thought it odd that water would leak right through glass. He believed that the condensed moisture on the outside of the pitcher oozed through the glass.

Is it not evident to you that with bees and frames, and packing and **WALLS** as warm as the bees, or, rather, all of the same temperature that there **CAN BE NO CONDENSATION?** What? But let into that packing icy air and the moisture condenses. Or let one or more walls get cold. The moisture will condense there.

Another thing. Common sense will fortify me. **THERE CAN BE NO UPWARD ESCAPE OF MOISTURE WITHOUT A CORRESPONDING ESCAPE OF HEAT.**

I have tried out the absorbent humbug with **WARM** packing. No condensation. I have tried it with two 1-inch holes in cover, and packing in contact with top bars, or nearly so. Result, wet packing. Another hive with super cover on and hole for bee escape covered with burlap. Dry packing.



Fig. 5—Buckeye double walled hive assembled.

Twenty-two colonies packed last winter in this way, *a la* Nature, Hives, Woodman PROTECTION, two walls of heavy lumber, 1" space packed with fine stuff. Super-cover with hole covered with inch block, six to eight inches of excelsior, dry leaves, planer shavings and so on, then the cover on *and* the holes in cover closed with corks. Results: big, sassy swarms, about 15 pounds of the stores gone March 15th. One to two frames of eggs and brood, and in hive 5 eggs in drone cells.

Last season I'd not have saved a bee had it nor been for the chaff hives. Understand I have no cellar and must winter out of doors.

Mr. Holterman, of Canada, abandoned a thousand-dollar cellar to winter out of doors. And he *PACKS*.

The bees in a state of nature get into a cavity in a tree. They dig out all the dead wood they can, generally making a conical cavity UPWARDS. This they varnish until it is waterproof. MAN to IMPROVE on NATURE comes along with an armful of hay and a 4-inch auger and bores a hole in from the top, puts the hay over it and goes away.

I try to follow nature. I have a hive so warm that only in rare cases will moisture gather on the walls, NEVER on the roof—super cover. Again following Nature, I have a LARGE entrance, $\frac{3}{4} \times 4$ ". I'd sooner have it $\frac{3}{4}$ by 14" than much smaller. I did not get to put wire over the entrances last fall, so scattered poisoned corn over the bee yard. No mice.

The essentials are: Sealed covers; large entrance; thick, warm walls; tight joints overhead; 4 to 6 or even 8" packing on top solid super cover; no holes in cover.

Probably one per cent of the bee keepers in the U. S. think for themselves. I TRY to be one of the one per cent."

Fred Briggs of New Sharon, Mahaska county, reports that his father kept bees in that locality for about forty years. During that time he wintered a part of his bees in double walled hives out of doors and a part of them in single walled hives in the cellar. After this long period he was still undecided, all things considered, whether they wintered better in the cellar or in the chaff hives outside. For himself Mr. Briggs writes as follows:

For my part I prefer the double walled hive well packed. They are not so handy to manipulate but for the good of the bees I much prefer them. The single walled hives if put in the cellar should have some sort of protection from cold snaps late in the fall before being put in and in the spring after being set out. * * There are generally a few warm days in winter when bees get a good fly outside. I think a good natural windbreak of great importance.

TENEMENT HIVES AND PACKING CASES.

Various kinds of tenement hives have been in use for many years, so that the idea of packing several colonies together for winter protection is not new. Much interest has been shown in the packing boxes as used by R. F. Holterman who is one of the most extensive honey producers of Canada. Mr. Holterman abandoned the use of a fine cellar, which had been built at a cost of about a thousand dollars, to winter in these tenements. His plan is to pack four colonies together as the following communication to "Gleanings in Bee Culture" will explain:

When wintering in the cellar my method was to remove the bees from the cellar and to place them on stands. They were next taken to clover pasture, sometimes a distance of thirty miles. Next they were taken to buckwheat, and finally returned to the bee yard in connection with the cellar.

By this method the hives and bees were unprotected during the spring, also in the autumn until placed in winter quarters about November 20. I was also compelled to be on hand when the cold weather began to moderate in spring, and there was always a good deal of anxiety as to the best time to set out, sometimes to find that, owing to conditions of weather, many bees had perished in their first flight, and others had drifted to the disadvantage of weaker stocks.

As I now winter the bees, four twelve frame Langstroth hives are wintered in an outer case; two hives are placed in the case side by side, and another two also side by side, but back to back with the first pair. This makes two sides of each hive have the best of winter protection—namely the protection of other hives warm with bees.

The fact that Mr. Holterman winters successfully outside as far north as Canada shows plainly enough that bees can be well wintered in the open air, if proper provision is made for them. It will be noted also that his hives are of the twelve frame size. Several years' observation indicate that bees seemed to winter better in the large hives than in the smaller ones. It is unfor-

fortunate that the eight frame hive is the one in common use in Iowa. While the eight frame hive is good in the hands of an expert comb honey producer, the larger hive is much better for the average person with only a few colonies managed largely on the let alone plan.

The writer's hives are of the eight frame size and considerable difficulty is sometimes encountered to get enough honey into a single hive body to insure sufficient stores for wintering outside. Best results in wintering have been secured by wintering the colonies in two hive bodies, one above the other, and leaving about ten or fifteen pounds more honey than seemed necessary. Two hives are then placed side by side close together in a dry goods box of one inch limber. The dry goods stores and the clothing stores get a number of boxes every fall, just about the right size to pack two hives in. A few boxes are large enough for packing three side by side (Fig. 6.) These do not give as good satisfaction, for the bees from the hive in the middle seem to go into the hives on either side until the colony which is most favored as far as warmth is concerned, comes through the winter rather weak from loss of deserting bees.

The advantage in using the dry goods box lies in the lower cost and less labor in getting it ready for a packing case. Sufficient lumber to make such a case would cost three or four times as much as is paid for the boxes. They need so little alteration that but a few minutes is necessary to make one over. As will be seen by fig. 7, a four inch board is removed in front of the entrance and turned inside the box to prevent the packing from dropping down in front. On warm days the bees are free to fly. Dry leaves are used for packing and about four inches of space is filled all round the hives and usually about six or eight inches over the top. As the hives are two stories high the bees have an abundance of room for spring brood rearing.

As before stated, the writer leaves about ten or fifteen pounds more honey in the hives in the fall than it is expected will be needed for wintering. With this surplus in the hive in spring, and the hives protected from the cold winds by the packing they need not be opened until the beginning of the honey flow. Colonies opened for the first time about May 1, have been found to be full of brood and honey from fruit bloom, and surprisingly, queen cells were started in preparation for swarming. At the same time colonies, without protection were making slow progress toward building up. It is very apparent that such colonies as described on May 1 are worth considerable, as honey gatherers during the clover flow. If the colonies reach such a condition early enough it is possible to divide them and to get two colonies in pretty good condition by the time the honey flow really



Fig. 6—Packing box with hives inside for outdoor wintering in author's apiary.



Fig. 7—Packing dry leaves around the hives in a dry goods box for wintering.

comes on. Where the main honey flow comes on later in the season, this early brood rearing is of no advantage, but here in Iowa bees need careful attention to get them in condition early enough as a rule. In these packing cases bees sometimes are strong enough to store some surplus from fruit bloom.

E. E. Townsend, of Fort Dodge, Webster county, is using a packing box, the sides of which are fastened together with metal hooks, and which can be taken apart and piled up in neat piles after use. Mr. Townsend also makes a packing case of the corrugated paper shipping cases in which groceries and provisions are shipped.

Frank Coverdale of Delmar, Clinton county, reports that he has almost perfect results from packing several colonies in an outer case with five or six inches of chaff on all sides. Chaff hives gave him good results in ordinary winters, but he has lost as high as fifty per cent in severe winters. He now winters in the cellar.

B. A. Aldrich of Smithland, Woodbury county, winters a few of his colonies in tenement hives, with leaves for packing. He reports that they build up a little earlier in the spring, and that the brood will always be found on the side of the hive next to its neighbor where the extra heat helps to keep up the temperature.



Fig. 8—The packing boxes may be used for chicken coops in summer.

CELLAR WINTERING.

It is surprising how many beginners report failure from cellar wintering, and with what accord the professional bee keepers recommend it. Most of the honey producers of long experience report that results were unsatisfactory when they first began using the cellar. With conditions just right cellar wintering seems to bring almost perfect results. The beginner usually makes use of any cellar that happens to be within reach, and too often it is too cold, or too damp, or subject to a wide range of temperature, or other condition that makes it unsuitable for wintering purposes. One of the principal advantages of outdoor wintering is that the bees build up earlier in spring. C. L. Pinney of LeMars, Plymouth county, uses a sprinkling can to water the colonies in the cellar once each week after February 15. The water is sprinkled on the alighting board and allowed to run into the hive. Sometimes a sponge is saturated with water and placed against the entrance. By this means he induces the bees to begin brood rearing in the cellar. Mr. Strong has tried placing a piece of ice on top of the frames and found the bees took it very eagerly.

ESSENTIALS OF A GOOD CELLAR.

In his correspondence with the bee keepers of Iowa, the writer has accumulated many good suggestions about the various matters relating to bee keeping, some of which are given in brief herewith:

S. W. Snyder, secretary of the Iowa Bee Keeper's association, has one of the best cellars in the state, and one that meets all requirements so perfectly that he has never lost a colony that went into the cellar in normal condition, with plenty of stores and a good queen. While much less expensive cellars will answer the purpose, the conditions to be met by all cellars are similar. The majority of bee keepers place a good deal of importance on having the cellar dry, although some say that dampness is no disadvantage if the temperature is even and does not go below forty degrees. Mr. Snyder's cellar is described as follows:

The cellar was constructed especially for the purpose and is under the shop and honey house and large enough to accommodate 200 colonies as he stores them.

First a stone wall about sixteen inches through was built. This wall was lined with hollow tile on which a coat of common plaster was applied. The cellar is ventilated by a chimney built from the ground and with an opening at the bottom and also at the ceiling. The chimney extends through the ceiling to the usual height above the roof. In addition to the chimney ventilator which is in the center of one end of the cellar, there are two three inch ventilators in the corners at the op-



Fig. 9—Concrete bee cellar in which G. W. Vance of Anthon, Iowa, has wintered his bees for many years.

posite end. This supplies sufficient ventilation for cold weather. In mild weather the door of the bee cellar is left open. This opens into another cellar room used for storage purposes all being kept in total darkness.

The bottom of the cellar is tile drained, the tile having outlet in the creek about a quarter of a mile distant. However, there is no direct outlet from the cellar, the tile being laid about three inches below the surface.

The ceiling is constructed of eight inch joist covered with tar building paper and overlaid with patent metal lath on which a coat of plaster is applied. Overhead of course there is the floor of the workshop.

No two of the cellars which the writer has visited are alike and all have their good points. A number of the most successful are apartments partitioned off from the vegetable cellar or the furnace room under a dwelling house. Most correspondents favor brick walls as they are dryer than cement walls as a rule. If too many colonies are placed in a cellar for the size of the space, there is a tendency for the temperature to rise too high in spring from the heat generated in the hives. Mr. Strong reports that a piece of ice under the cloth on top of the frames is quickly covered with bees which take it very eagerly. The ice had the effect of quieting the bees and it is quite probable that a sprinkling such as recommended by Mr. Pinney would be of help where the bees get restless and the temperature rises too high.

REPORTS AND EXPERIENCES.

The following are very brief extracts from a few of the many letters that have reached the writer in regard to this subject. Most of the persons quoted have had long experience in bee keeping in Iowa. The different results may be accounted for, in part, by the difference in locality.

E. C. Wheeler, Marshalltown, Marshall County: In general any place suitable for wintering potatoes is safe for bees. Outdoor wintering has been a failure with me. I winter with tops and bottoms sealed fast and remove the colonies in spring when the soft maples begin to bloom. Don't take the colonies out on wash day.

Eugene Secor, Forest City, Winnebago County: Average consumption of stores with me from November 15 to April 10 not more than twelve pounds per colony which I consider cheap wintering. It is a mistake to leave the bees out too long in fall or to take them out too early in spring. Cellar wintering is uniformly successful with me. Forty years in northern Iowa.

T. W. Blackman, Nevada, Story County: With bottom boards left on the hive and one inch entrances covered with wire screen to keep out mice we have very light winter losses, none at all last winter. Cellar kept at forty degrees and find the bees quieter than at forty-five.

S. W. Snyder, Center Point, Linn County: Winter only in cellar described elsewhere. Never lost a colony which went into the cellar in normal condition. All covers and bottom boards are removed and a row of hives placed on the bench sixteen inches above the floor. About four inches of space is left between the hives. A muslin quilt is spread over the tops completely covering the hives. Another row is then placed on top of these with each hive over the space between those underneath. This plan of alternate tiering is continued to the top of the cellar or as high as necessary to accommodate all the bees.

Frank Coverdale, Delmar, Clinton County: Damp cold cellars and basement of barn both proved a failure. In dry cellar which does not freeze losses did not average three percent for thirteen years. Find lots of pure air necessary for best results. Losses have been extremely heavy in years when honeydew was left in the hives.

J. L. Strong, Clarinda, Page County: Wintered in a pit many years ago without loss, then again with sixty per cent loss and what was left came out in bad condition. Cold cellar also proved a failure. Have wintered thirty stands packed out of doors for thirty years with an average of about ten per cent of loss. From fifty to one hundred and twenty-five colonies have been wintered in the cellar for the same period with about an equal per cent of loss, mostly from failing queens. Greatly prefer the cellar as an average of eight pounds of stores will carry a colony from November 15 to March 15 in the cellar.

C. H. True, Edgewood, Clayton County: Cellar wintering has been uniformly successful with an average loss of less than five per cent, for ten years past. The causes of spring dwindling are mostly in control of the bee keeper. Bees wintered outside consumed one third more stores and did not apparently build up any earlier.

G. W. Nance, Anthon, Woodbury County: Chaff hives have proved disappointing. Bees have wintered in dry warm cave without ventilation not to exceed ten per cent average loss for twenty-four years,

while outdoor losses have been heavy in either single or double walled hives. Bees should be left in the cave until about the middle of April.

A. B. Tackaberry, Cantril, Van Buren County: Out door wintering losses average about fifteen per cent, with no loss of normal colonies wintered in the cellar. One yard is wintered in the cellar with two wintered outside. The cellar wintered bees are always ahead. Honeydew about one year in five causes about fifty per cent winter loss if not removed from the hive. Double walled hives have not proved satisfactory.

Edw. G. Brown, Sergeant's Bluff, Woodbury County: Where conditions are normal cave wintered bees have not lost to exceed ten per cent as an average including spring losses. Have wintered by packing outside with good results but this method requires too much time and labor with greatly increased consumption of stores.

F. W. Hall, Colo, Story County: After trying every plan have decided that for Iowa conditions cellar wintering is best. Of equal numbers wintered in cellar and packed outside losses have been several times greater in outdoor wintered colonies. (Sioux County). In Story county lost only one colony in 356 wintered in the cellar. In one cellar which was too warm losses were heavier. When bees are in right condition they will winter in almost any hole in the ground. No apparent differences in results whether tops and bottoms are left on, or removed.

W. S. Pangburn, Center Junction, Jones County: A seven-eighth inch entrance is used winter and summer. The bees are tiered up five high in cellar with front of hive one inch lower than back. The door is frequently opened at night to let in fresh air. Temperature is not so important as proper ventilation and a dry cellar. The results of wintering are frequently perfect, but have had some losses when honey dew was mixed with the stores. Spring dwindling is caused by putting the bees out too early. Plenty of stores for early brood rearing are important.

B. A. Aldrich, Smithland, Woodbury County: The fellow who can winter successfully is the successful honey producer. Spring dwindling is the result of poor wintering. For ten or twelve years of first bee experience I wintered on natural stores with heavy losses, clogged entrances, dampness, cellars foul, etc. Now all old queens are replaced in the swarming season. In the fall most of the honey is extracted and the bees fed sugar syrup. Forty to fifty pounds of stores not too much for Iowa. The extra weight of double walled hives bars them from the Aldrich apiaries. With proper provision for winter and a good cellar winter losses are small.

SUMMARY.

The extensive honey producers are agreed on certain things that are essential to successful wintering by any method. These are sufficient stores of good quality, strong colonies, vigorous queens and a dry situation. Many letters mentioned the importance of spring protection by a suitable windbreak. If all these conditions are met the method of wintering is not of so much importance. Bees with an old queen, or poor stores or weak in numbers need much better protection in order to survive the winter than is necessary for prime colonies.

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